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GB 1490636
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GB 1125315
GB 993482
GB 650062
US 4079475
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(54) Making single threaded nut

(57) An element e.g. a nut (10*a*) having a single internal thread is manufactured by molding or casting, in such a way that the beginning (15*a*) of the thread (11*a*) is adjacent to one of the thicker portions (14*a*) of said element. By thus starting the thread at the strongest point of the casting, the strength of the element is substantially increased.

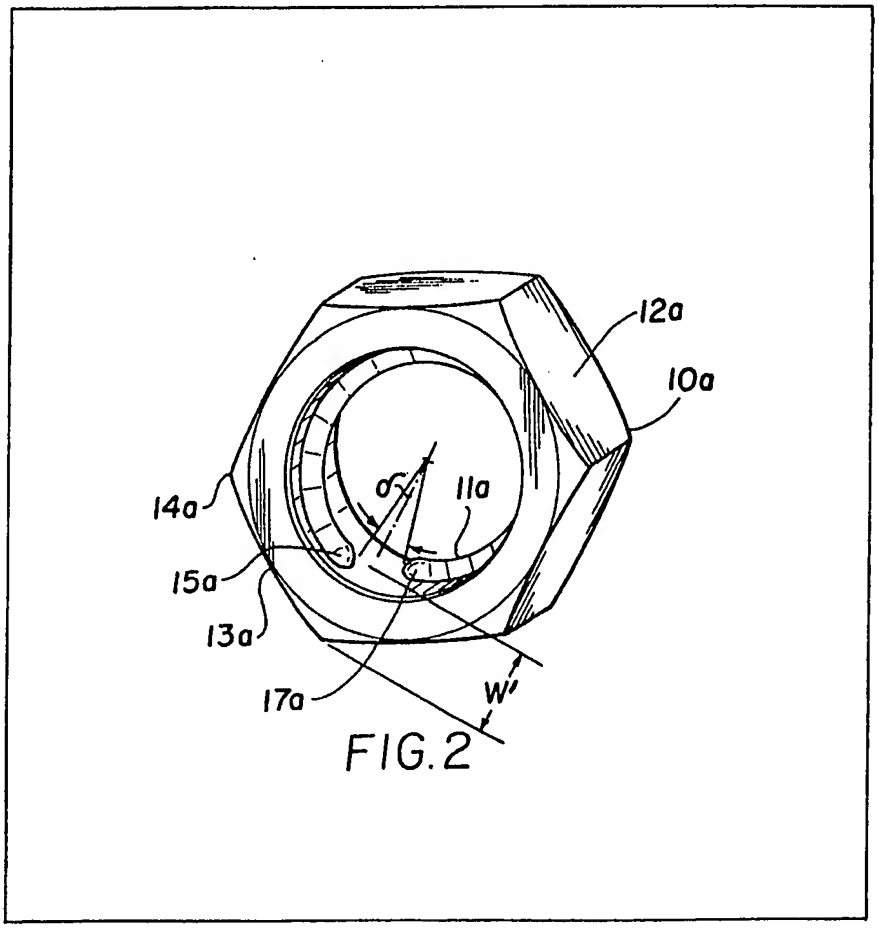

FIG.2

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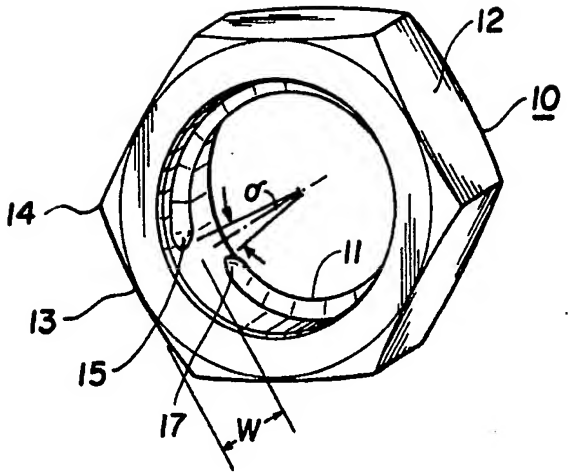

FIG. 1 PRIOR ART

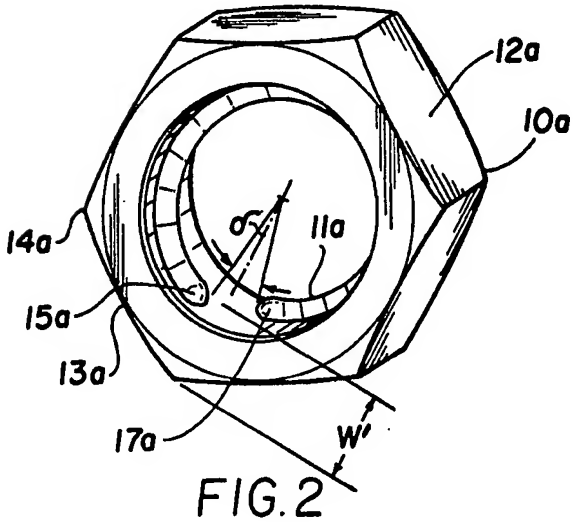

FIG. 2

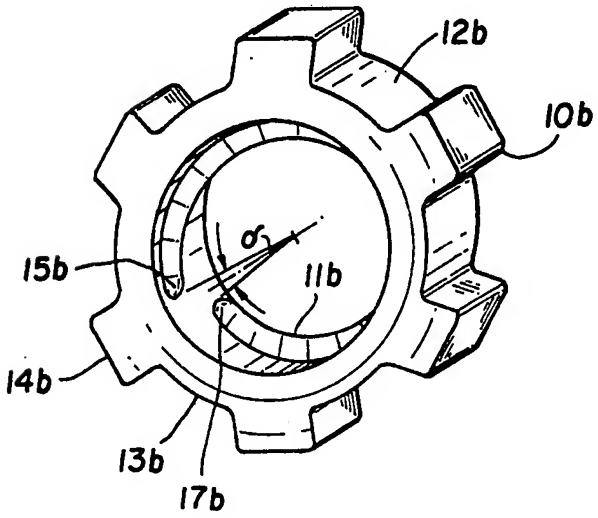

FIG. 3

SPECIFICATION

Internally cast or molded single threaded nut and process for manufacturing the same

This invention relates to an internally cast or molded single threaded element and a process for manufacturing the same, and more particularly to such an element in the form of a nut having increased mechanical strength, and a process for making the same.

Nuts having a single internal thread are commonly employed in the manufacture and assembly of electrical and electronic devices, and for other purposes. A process for economically manufacturing such nuts in a single casting or molding operation is described in U.S. Patents Nos. 2,133,019 and 4,079,475, the latter patent being assigned to the assignee of the instant application.

In manufacturing single internally threaded nuts according to the molding process described and claimed in U.S. Patent 4,079,475, Applicant found that the resulting nuts did not have sufficient tensile and torque strength to meet certain industrial requirements.

Accordingly, an object of the present invention is to provide an internally single molded or cast element and more particularly, an internally single threaded molded or cast nut having an increased mechanical strength.

As herein described, there is provided a cast or molded internally single threaded nut having upper and lower major surfaces and a plurality of wrench-engaging surfaces, extending between said major surfaces, said nut having a single internal helical thread and regions of greater and lesser material thickness normal to said thread in the radial direction thereof, the beginning of said thread being radially aligned with one of said regions of greater material thickness, so that said nut is stronger than a nut in which the beginning of the thread is not so aligned.

Also provided herein is a process for manufacturing a cast or molded internally single threaded element and specifically, a cast or molded internally single threaded nut having upper and lower major surfaces and a plurality of wrench-engaging surfaces extending between said major surfaces, comprising the steps of: providing a die block means defining a space having the desired shape of the exterior non-circular surface of said nut and of the internal single threaded surface thereof, said die block means including a vertically oriented parting line shut off surface defining the ends of said thread; introducing a hardenable liquid within said recess; causing said fluid to harden; and removing the hardened material from said recess, said hardened material forming a nut having a single helical thread and regions of greater and lesser material thickness normal to said thread in the radial direction thereof, the improvement wherein said vertically oriented parting line shut off surface is radially aligned with a portion of said recess corresponding to one of said regions of greater material thickness, so that said nut is stronger than a nut made by aligning said shut off surface with a region of lesser material thickness.

In the Drawing

FIGURE 1 shows an internally cast or molded single threaded hexagonal nut made by the process of U.S. Patent 4,079,475;

FIGURE 2 shows a corresponding hexagonal nut made by the process of the present invention; and

FIGURE 3 shows a coaxial type nut made by the process of the present invention.

Referring to Fig. 1, the die cast nut 10 has a hexagonal periphery, and planar opposing major surfaces with an internal hole adjacent the thread 11. The thread 11 has a helical configuration and extends through a circumferential angle of less than 360°, with an angular space δ on the order of 5 to 15°. The ends of the thread 11 are vertically separated, i.e., separated in a direction extending between the major surfaces of the nut 10, by a distance equal to the desired thread pitch, and the diameter of the thread 11 corresponds to the diameter of the shaft with which said thread is to be compatible.

The nut 10 corresponds to the nut shown in Fig. 1 of U.S. Patent 4,079,475, and is made by the process described therein, the entire disclosure of said patent being incorporated herein by reference. Except as otherwise specifically stated hereafter, all terms utilized in the specification and claims of this application have the same meaning as said terms have in U.S. Patent 4,079,475.

Applicant has found that the strength of the nut 10 can be substantially increased by altering the molding process so that the beginning 15 or 17 of the thread 11 is adjacent a portion of the nut having greater rather than lesser width in the radial dimension.

That is, in Fig. 1, the ends of the thread 11 are disposed adjacent a flat 12 of the nut 10, so that the radial width of the nut in this region is defined by the dimension W.

By rotating the core pins 13 and 14 of Figure 7 of U.S. Patent 4,079,475, through an angle of about 30° with respect to the mold recesses 29, the vertically oriented parting line shut off surface 20 which defines the ends of the thread 11, is brought into radial alignment with one of the "corners" of the recesses 29, i.e., a region where the nut will be formed with greater rather than lesser radial width.

In the resulting nut 10a shown in Fig. 2 of the drawing, the ends 15a and 17a of the thread 11a are radially aligned with the corner 14a of the nut 10a, i.e., the portion of said nut having a greater rather than lesser radial width W', which is obviously greater than the corresponding dimension W of the nut 10 shown in Fig. 1. Applicant has found that this repositioning of the ends of the thread 11 results in approximately a 30% increase in the torque which the nut is able to withstand without breaking.

Except for the rotation of the core pins with respect to the mold recess, the method for manufacturing the nut 10a is the same as that described in U.S. Patent 4,079,475 if desired, the core pins may be formed integral with one or both of the corresponding die blocks, rather than as separate piece parts.

Fig. 3 shows a "coaxial"type nut having 6 radial protuberances which may be engaged by a tool to rotate the nut. The ends 15b and 17b of the thread 11b are radially aligned with one of the protuberances 14b, i.e., a portion of the nut 10b having greater rather than lesser radial width (as opposed to aligning the thread ends with a region 13b of lesser radial width). The nut 10b may be made by the process of U.S. Patent No. 4,079,475, with alignment of the core pins to provide the thread ends radially adjacent the protuberance 14b, and the die block cavity shaped to provide the desired coaxial nut configuration.

The molding process described above is particularly suited to the manufacture of nuts having increased strength according to the present invention, since it is essential to situate the ends of the thread adjacent a portion of the nut having greater rather than lesser radial width, and such positioning cannot be assured with conventional nuts having threads cut by a standard threading tool.

CLAIMS

1. In a process for manufacturing a cast or molded internally single threaded element having upper and lower major surfaces and a plurality of wrench-engaging surfaces extending between said major surfaces, comprising the steps of:

providing first and second contiguous opposed die blocks, each block having a recess therein, said recesses cooperating to converge along a parting line and defining a space having the desired shape of the exterior non-circular surface of said element

disposing first and second aligned core pins within said first and second die blocks respectively, each pin having a protruding portion extending into the recess of the corresponding die block.

each said protruding portion comprising a helical ramp having an outer diameter and pitch corresponding to the desired diameter and pitch of an internally threaded surface to be formed within said product, said ramp extending through a circumferential angle of less than 360°, said protruding portion including a vertically oriented parting line shut off surface extending between the ends of said ramp, the outer edge of said ramp having a peripheral edge groove therein, said groove extending along the edge of said ramp except in the vicinity of said vertically oriented surface, said ramp having first and second shoulder portions extending between said vertically oriented surface and the ends of said groove,

the protruding portions of said core pins being aligned so that the ramps thereof are in abutting relationship with the grooves of said ramps communicating with each other to form a space defining the shape of the internal thread to be formed on said surface;

introducing a hardenable fluid within the spaces between said die blocks and said core pins;

causing said fluid to harden;

seaprating said first core pin and first die block from said second core pin and second die block; and removing the hardened material from said spaces,

said hardened material forming an element having a single helical thread and regions of greater and lesser material thickness normal to said thread in the radial direction thereof,

the improvement wherein said disposing step is carried out by radially aligning said vertically oriented parting line shut off surfaces with a portion of said recesses corresponding to one of said regions of greater material thickness, so that said element is stronger than an element made by aligning said shut off surfaces with a region of lesser material thickness, so that said element is stronger than an element made by aligning said shut off surfaces with a region of lesser material thickness.

2. A cast or molded internally single threaded element having upper and lower major surfaces and a plurality of wrench-engaging surfaces extending between said major surfaces, said element having a single internal thread and regions of greater and lesser material thickness normal to said thread in the radial direction thereof, the beginning of said thread being radially aligned with one of said regions of greater material thickness, so that said element is stronger than an element in which the beginning of said thread is not so aligned.

3. A cast or molded internally single threaded element according to claim 2 in the shape of a nut.

4. In a process for manufacturing a cast or molded internally single threaded nut having upper and lower major surfaces and a plurality of wrench-engaging surfaces extending between said major surfaces, comprising the steps of:

providing a die block means defining a space having the desired shape of the exterior noncircular surface of said nut and of the internal single threaded surface thereof, said die block means including a vertically oriented parting line shut off surface defining the ends of said thread;

introducing a hardenable liquid within said recess;

causing said fluid to harden; and

removing the hardened material from said recess, said hardened material forming a nut having a single helical thread and regions of greater and lesser material thickness normal to said thread in the radial direction thereof,

the improvement wherein said vertically oriented parting line shut off surface is radially aligned with a portion of said recess corresponding to one of said regions of greater material thickness, so that said nut is stronger than a nut made by aligning said shut off surface with a region of lesser material thickness.

5. A process according to claim 1 wherein said element is a nut.

6. In a process for manufacturing a cast or molded internally single threaded nut having upper and lower major surfaces and a plurality of wrench-engaging surfaces extending between said major surfaces, comprising the steps of:

providing first and second contiguous opposed die blocks, each block having a recess therein said recesses cooperating to converge along a parting line and defining a space having the desired shape of the exterior non-circular surface of said nut, each die block including a protruding portion extending into the recess of the corresponding die block,

each said protruding portion comprising a helical ramp having an outer diameter and pitch corresponding to the desired diameter and pitch of an internally threaded surface to be formed within said product, said ramp extending through a circumferential angle of less than 360°, each said protruding portion including a vertically oriented parting line shut off surface extending between the ends of said ramp, the outer edge of said ramp having a peripheral edge groove therein, said groove extending along the edge of said ramp except in the vicinity of said vertically oriented surface, said ramp having first and second shoulder portions extending between said vertically oriented surface and the ends of said groove,

said protruding portions being mutually disposed so that the ramps thereof are in abutting relationship with the grooves of said ramps communicating with each other to form a space defining the shape of the internal thread to be formed on said surface;

introducing a hardenable fluid within the spaces between said die block recesses and said mutually disposed protruding portions;

causing said fluid to harden;

separating said first core pin and first die block from second core pin and second die block; and

removing the hardened material from said spaces,

said hardened material forming a nut having a single helical thread and regions of greater and lesser material thickness normal to said thread in the radial direction thereof,

the improvement wherein said disposing step is carried out by radially aligning said vertically oriented parting line shut off surfaces with a portion of said recesses corresponding to one of said regions of greater material thickness, so that said nut is stronger than a nut made by aligning said shut off surfaces with a region of lesser material thickness.

7. A process for manufacturing a cast or molded internally single threaded element substantially as described herein.

8. A cast or molded internally single threaded element whenever prepared by a process according to any of claim 1, 4, 5, 6 or 7.

9. A cast or molded internally single threaded element substantially as described herein and as illustrated by the drawings herein.

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